Advance

SIGNAL GENERATOR

Type E2

Including E2/E, E2/NA

INSTRUCTIONS

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Advance

SIGNAL GENERATOR

Type E2

Introduction

The type E2 signal generator has a wide frequency range, and an accurate attenuator system. It is designed to provide a degree of accuracy sufficient for all practical purposes in the measurement of selectivity and sensitivity in radio receivers. Provision is made for external modulation with low power input up to 10 kc/s, as well as for 400 c/s 30% internal modulation. The frequency range is 100 kc/s to 100 Mc/s, thus covering the sound broadcasting and band 1 television frequencies on fundamentals.

Specification

FREQUENCY

Directly calibrated in six ranges:—

Range	*Range*
A: 30 to 100 Mc/s	D: 1 to 3 Mc/s
B: 10 to 30 Mc/s	E: 300 to 1,000 kc/s
C: 3 to 10 Mc/s	F: 100 to 300 kc/s

Accuracy $\pm 1\%$

OUTPUT VOLTAGE

Obtained at the end of the 75 ohm matched transmission line.
Continuously variable from 1μV to 100 mV.
Accuracy of maximum output $\pm$3dB.
Accuracy of step attenuator $\pm$ (3dB+3μV).

OUTPUT IMPEDANCE

At the end of unterminated transmission line, 75 ohms.

When terminated by TP1B Pad, three values are available: 37 ohms, 10 ohms or 10 ohms through the standard all-wave dummy aerial.

ONE VOLT OUTPUT SOCKET

Provides 1 volt±3 dB. Into 1000 ohm Load.

INTERNAL MODULATION

30% (±5%) at 400 c/s (±10%).

EXTERNAL MODULATION

0 to 80% from 10 c/s to 4 kc/s, falling to 40% at 10 kc/s.
Input impedance is 50k ohms.

A. F. OUTPUT

Approximately 0-50V, 400 c/s at high impedance.

R. F. LEAKAGE

Less than 3μV.

VALVES

One ECC91 (6J6); one 6SN7GT; one 6X5GT; one 11mm. 6.5V pilot lamp.

ACCESSORIES

One termination pad and dummy aerial, Type TP1B; one shielded R.F. lead with plug and socket, Type PL27; one A.F. lead with plugs and crocodile clips, Type PL28.

POWER SUPPLY

105 to 125 and 210 to 250 volts, 40 to 100 c/s (a.c. only).

Consumption approximately 20 watts.

(Special Model, E2/NA, 117 volts, 25-60 c/s).
(a.c. only).

DIMENSIONS

13 in. wide x 10¼ in. high x 8 in. deep
(33.0 cm. x 26.0 cm. x 20.3 cm).

WEIGHT

17½ lb (8 kg).

FINISH

The instrument is in an attractive steel case, the panel and case being sprayed a durable grey enamel. A plastic carrying handle is provided.

Instructions

MAINS VOLTAGE

The instrument is available in three versions to suit differing a.c. mains supplies. These are:

type E2: 105 to 125 volts, and 210 to 250 volts, 40 to 100 c/s.

type E2/E: 110 to 125 volts, 140 to 160 volts, and 220 volts, 40 to 100 c/s.

type E2/NA: 117 volts, 25 to 60 c/s.

The standard model, type E2, is normally despatched with the mains voltage adjustment set for operation at 210 to 250 volts, that is, with tag 2 connected to tag 3. To adjust for 105 to 125 volt operation, remove the disc on the underside of the case and expose the tags on the mains transformer, remove the connection between tags 2 and 3, connect tag 1 to tag 2, and tag 3 to tag 4. Replace the cover disc.

FREQUENCY

A signal of any frequency between 100 kc/s and 100 Mc/s is obtainable to an accuracy of ± 1% by means of a directly calibrated scale and a 6-waveband selector switch.

FULL R.F.

Output at the FULL R.F. socket is approximately one volt and is not controlled by the attenuators. For the full output the load impedance should be not less than 1,000 ohms. A cover is fitted over the FULL R.F. socket to prevent radiation from the socket invalidating measurements at low signal level.

R.F. ATTENUATORS

When the ATTEN. R.F. socket is used the FULL R.F. socket must be closed with its cover.

The signal is controlled by two attenuators. The output from the oscillator section is fed first to the non-inductive VOLTAGE OUTPUT potentiometer, and then to the MULTIPLIER, a five-step attenuator calibrated: X1, X10, X100μV and X1, X10, mV. Thus, multiplying the indication of the two controls, the output varies from 1 microvolt to 100 millivolts. The output impedance is 75 ohms except on step X10 mV, when it varies from 65 to 75 ohms according to the setting of the VOLTAGE OUTPUT attenuator.

Accuracy of Step Attenuator ± (3dB + 3μV)

Accuracy of Maximum Output ± 3dB

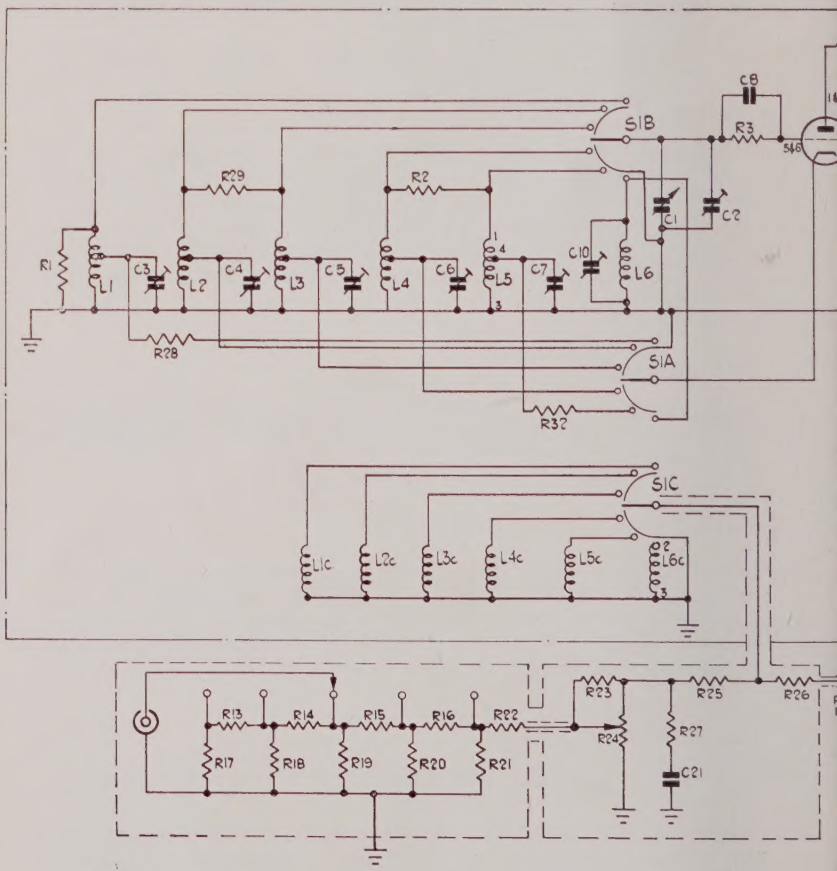
CIRCUIT CODE

RESISTORS

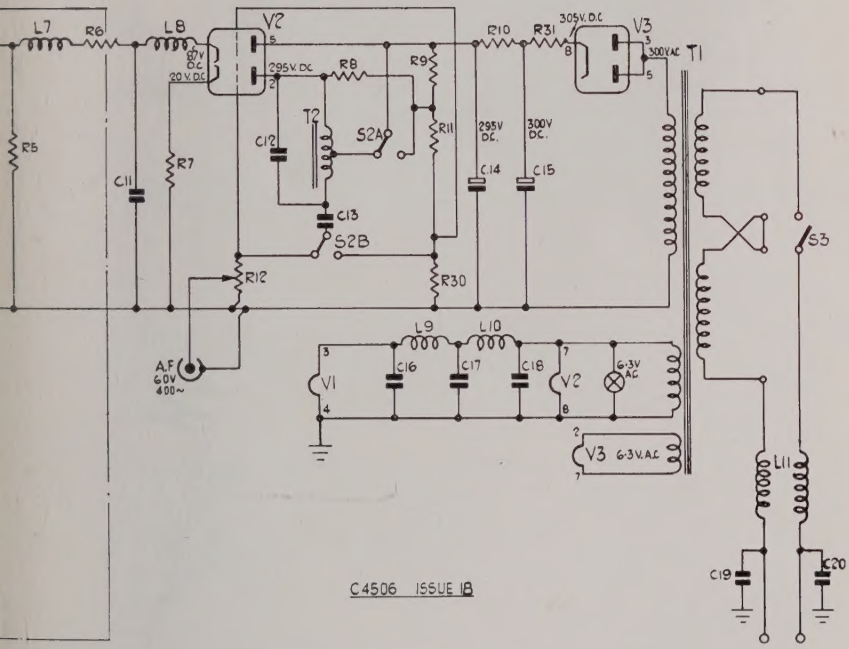
Ref.	Description	Pt. No.	Ref.	Description	Pt. No.
R 1	39K ± 5% RMA9	869	R17	82 Ω± 10% RMA9	3387
R 2	4.7K ± 5% RMA9	1499	R18	91 Ω± 10% RMA9	3388
R 3	15K ± 5% RMA9	117	R19	91 Ω± 10% RMA9	3388
R 4	22 Ω± 5% RMA9	4419	R20	91 Ω± 10% RMA9	3388
R 5	33K ± 5% RMA9	1183	R21	220 Ω± 10% RMA9	8580
R 6	1K ± 5% RMA9	1175	R22	120 Ω± 10% RMA9	3646
R 7	3.3K W/W 3W N.1.	2736	R23	180 Ω± 10% RMA9	1430
R 8	100K ± 5% RMA9	1270	R24	91 Ω± 10% RMA9	3754
R 9	100K ± 10% RMA9	1270	R25	100 Ω± 10% RMA8	2021
R10	1K ± 5% RMA9	6911	R26	56 Ω± 10% RMA9	7142
R11	2.7M ± 10% RMA9	7434	R27	82 Ω Carbon pot.	3387
R12	50K ± 10% RMA9	5276	R28	1K ± 5% RMA9	1175
R13	750 Ω± 10% RMA9	3386	R29	100K ± 5% RMA9	1270
R14	750 Ω± 10% RMA9	3386	R30	1M± 5% RMA9	1171
R15	750 Ω ERIE9	3386	R31	560 Ω± 5% RMA9	5143
R16	750 Ω± 10% RMA9	3386	R32	33 Ω± 5% RMA9	11979

CAPACITORS

Ref.				Description	Pt. No.
C 1	...	528pF	...	Plessey single gang	7368
C 2	...		...	Wire trimmer	7810
C 3	...		...	Wire trimmer	7810
C 4	...		...	Wire trimmer	7810
C 5	...		...	Wire trimmer	7810
C 6	...		...	Wire trimmer	7810
C 7	...		...	Wire trimmer	7810
C 8	...	100pF	...	± 5% Silver mica	2758
C 9	...	1,000pF	...	± 20% M/M Hunts	5325
C10	...		...	Wire trimmer	7810
C11	...	1,000pF	...	± 20% M/M Hunts	5325
C12	...	.05μF	...	350 volts T.C.C. Tub. paper	7491
C13	...	.05μF	...	350 volts T.C.C.	8090
C14	...	16+16μF	...	Hunts electrolytic	7014
C15	...				
C16	...	1,000pF	...	± 20% M/M Hunts	5325
C17	...	1,000pF	...	± 20% M/M Hunts	5325
C18	...	.005μF	...	± 15% M/M Hunts	1524
C19	...	.005μF	...	± 15% M/M Hunts	1524
C20	...	.005μF	...	± 15% M/M Hunts	1524
C21	...	40pF	...	± 20% Ceramic	4820



Every effort is made to keep this circuit up to date, but the right is reserved adjust the values or amend the circuit without notice.



C4506 ISSUE 1B

B-F RANGE COILS

CIRCUIT CODE (cont.)

MISCELLANEOUS

Ref.	Description		Pt. No.
V 1	ECC91	R.F. Oscillator	7034
V 2	6SN7GT	Modulator	5873
V 3	6X5G	Rectifier	3150
T 1	Mains transformer		MT294
T 2	Mod. transformer		MT308
L 1	Coil, Osc.	100 to 300 kc/s	RF539
L 1c	Coil, Coupling		
L 2	Coil, Osc.	300 to 1 Mc/s	RF538
L 2c	Coil, Coupling		
L 3	Coil, Osc.	1 to 3 Mc/s	RF537
L 3c	Coil, Coupling		
L 4	Coil, Osc.	3 to 10 Mc/s	RF536
L 4c	Coil, Coupling		
L 5	Coil, Osc.	10 to 30 Mc/s	RF535
L 5c	Coil, Coupling		
L 6	Coil, Osc.	30 to 100 Mc/s	L00P
L 6c	Coil, Coupling		
L 7	H.T. r.f. choke		C121
L 8	H.T. r.f. choke		C 16
L 9	L.T. r.f. choke		C 95
L10	L.T. r.f. choke		C 95
L11	Mains r.f. choke		C 83
S1A ... S1B ... S1C	Band change switch		7381
S2A ... S2B	Mod. switch		6846
S3	Mains On/Off switch		Part of R12

B—F RANGE COILS

All readings taken with generator set to 1.5 Mc/s with modulation switched on a.f. output at max.

All d.c. readings taken on Avometer Model 8 (20,000 ohms per volt).

All l.f. readings taken on Advance "Advac" (a.c. valve millivoltmeter).

R.F. output readings taken on Crystal millivoltmeter.

TERMINATION PAD TYPE TP1B

In order to obtain the outputs stated, it is necessary for the output socket to be correctly terminated with a 75 ohms load. Such a load is provided by the connector type PL28 and the Termination Pad type TP1B. The following outputs are obtainable from the TP1B:

1. output impedance 37 ohms and voltage as indicated
2. output impedance 10 ohms and voltage one-tenth of that indicated
3. output impedance that of a standard all-wave dummy aerial and voltage one-tenth of that indicated.

Refer to circuit diagram for circuit of TP1B.

At frequencies above 10 Mc/s, the connection from the pad to the receiver should be as short as possible, and certainly not longer than three inches.

AUDIO FREQUENCY

When the MOD switch is in the INT position the carrier output is modulated 30% at 400 c/s. The A.F. control, which is combined with the mains on-off switch, varies the a.f. voltage (400 c/s) available at the A.F. socket from 0 to 50 volts (high impedance load).

When the MOD switch is in the CW-EXT position the carrier is normally unmodulated. For external modulation inject an a.f. signal from an external source into the A.F. socket. It is important that the A.F. control is set at **MAXIMUM** when using an external source. External modulation is possible from 10 c/s to 10 kc/s.

The maximum undistorted modulation is 80% at low frequencies, falling off as the frequency rises.

For modulation frequencies less than one-fiftieth of the carrier, maximum modulation is 80% at 4,000 c/s, falling to 40% at 10 kc/s.

Modulation depth % (15 × input volts)

Input impedance = 50,000 ohms

CONNECTOR TYPE PL27

This connector, which has crocodile clips at one end, is to be used for a.f. testing and i.f. alignment.

CONNECTION TO POINTS OF HIGH POTENTIAL

It must be remembered that all outputs have low resistance paths to earth. Therefore if a signal is to be injected into apparatus at a point which has high potential to earth, a blocking capacitor must be inserted in series with the generator output.

MAINTENANCE

To remove the instrument from the case proceed as follows:

REMOVE THE DOME NUT FROM THE REAR OF THE CASE. Lay the instrument on its back and remove the four screws in the corners of the panel, each a little at a time. The instruments can then be lifted from the case.

To Reassemble: Lay the case on its back and replace instrument. Engage the threads of the corner screws, stand the instrument upright and carefully screw down the panel evenly, making sure that the back chassis bolt appears through its clearing hole in the case. The dome nut must then be replaced.

The ECC91 valve is in an internal screening box holding the oscillator assembly. To open this box remove the pilot lamp-bracket and undo the self-tapping screws on the edges of the box. Care must be taken not to disturb the trimmers and coil assembly. The trimmers MUST ON NO ACCOUNT be adjusted, as this will make the frequency calibration incorrect. The ECC91 oscillator valve may be replaced without appreciable effect on the calibration. To ensure reliable screening ALL screws must be replaced when the screen is refitted.

In all cases of difficulty the instruments should be returned to the factory for repair or adjustment.

AFTER SALES SERVICE

Our factory Service Department is at your disposal should you wish to obtain further repair information by telephone or letter. The Type and Serial Number of the instrument should always be quoted. We maintain an efficient Service facility, and the instrument can, if desired, be returned to our factory for repair.

The instrument is guaranteed for a period of one year from its delivery to the purchaser, for the replacement of defective parts other than valves (tubes) and fuses.

Valves (tubes) are subject to the manufacturer's guarantee.

Equipment returned to us for servicing must be adequately packed, preferably in the special box supplied, and shipped with transportation charges prepaid. We can accept no responsibility for instruments arriving damaged.

Should the cause of failure during the guarantee period be due to misuse or abuse of the instrument, or if the guarantee has expired, the repair will be charged and put in hand without delay unless other instructions are received.

OUR SALES, SERVICE AND ENGINEERING DEPARTMENTS ARE AT YOUR SERVICE AT ALL TIMES

PN9171/4/62/200 L & W Press Printed in England